

EFFECT OF MINERAL ADMIXTURE ON PROPERTIES OF STEEL FIBER REINFORCED CONCRETE

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Abstract

An experimental program was carried out to evaluate the mechanical properties of cement-based composites by using silica fume with and without steel fibers on Portland Pozzolona cement. Test variables included dosage of silica fume 0%, 4%, 8%, 12% and 16%, with addition of volume fraction of crimped steel fibers of two diameters 0.5 mm Ø and 1.0 mm Ø with a constant aspect ratio of 60, at various percentages as 0%, 0.5 %, 1.0 % and 1.5 % by the volume of concrete on M30 grade of concrete, and Compressive strength, Dynamic Modulus of Elasticity and Ultrasonic Pulse Velocity of concrete were performed. As a result the incorporation of crimped steel fibers, Silica fume and Portland Pozzolona cement has produced a strong composite with superior crack resistance, improved ductility and strength behavior prior to failure. On the basis of regression analysis of large number of experimental results, the statistical model has been developed. The proposed model was found to have good accuracy in estimating relationship at 28 days and 90 days Compressive strength with Dynamic Modulus of Elasticity and Ultrasonic Pulse Velocity of concrete. Addition of fibers provided better performance for the cement-based composites, while silica fume in the composites may adjust the fiber dispersion and strength losses caused by fibers, and improve strength and the bond between fiber and matrix with dense calcium-silicate-hydrate gel. The results predicted by mathematically modeled expressions are in excellent agreement with experimental results.

Keywords :Portland Pozzolona Cement, Silica Fume, Steel Fibers, Compressive Strength, Dynamic Modulus of Elasticity, Ultrasonic Pulse Velocity.